

EPA Review Comments on Predesign Investigation Work Plan,
Including Sampling and Analysis Plan,
Dated October 24, 2018

General Comments

1. Figures from other documents were referenced throughout the document. Please either provide these figures in the document or provide a compilation of these figures as a stand-alone reference if it is anticipated that they will be relevant in forthcoming documents.
2. There are several instances where the Work Plan refers the reader to the SAP or the SAP refers the reader to the Work Plan. In following these references, there is sometimes insufficient information or direction to instruct the field staff in conducting the proposed activities. In addition, except for the three PFAS SOPs, SOPs are not included. If other SOPs are appropriate (e.g., logging soil, collecting groundwater samples, and cleaning equipment), they should be included with the planning documents.
3. This document refers to 1,4-dioxane as both a VOC and SVOC. From an analytical perspective, 1,4-dioxane can be prepared for analysis as a VOC or an SVOC. However, due to its physical properties, 1,4-dioxane cannot be easily purged as a VOC. Region III's Office of Analytical Services and Quality Assurance generally recommends analysis of 1,4-dioxane as an extractable SVOC. Please provide documentation to support the analysis of 1,4-dioxane as a VOC.
4. The SAP should include a provision for a biennial evaluation of tentatively identified compounds for potential addition to the target analyte list.
5. Certain specific comments on the PDI Work Plan, below, also apply to the RD Work Plan, whether noted in the comment or not.
6. There is redundant numbering for some footnotes, e.g., "Existing slurry-wall system;^{24[23]}" in Section 4.4.

Specific Comments

7. **Section 1.2.1, Brief Site History and Description:** Please change the title of this section to "Brief Site Description and Disposal History," consistent with the title of Section 2.1 in the RD Work Plan.
8. **Section 1.2.2, Aquifer Use:** In the second to last paragraph of this section, AWC's aquifer storage and recovery (ASR) system is discussed. However, the discussion here and in the referenced section of SSCR, Rev. 2 is unclear as to whether the ASR well is still used and, if so, the frequency and duration of use. In Section 3.5.5, uncertainty regarding capture zones along the east side of the attainment area is discussed in connection to the shutdown of wells AWC-G3 and AWC-K1 in 2012. The presence and potential use of the ASR system also impact the uncertainty and should be discussed. Also, language should be added identifying the monitoring



system components in the downgradient portions of the plumes that will address these uncertainties.

9. **Section 3.1.1, Geology, first paragraph:** Slide 8 from Tetra Tech's memo is not included in Appendix D in the Work Plan. However, Figure 2.1 in Appendix C of the Work Plan depicts known/identified zero clay areas.

10. **Section 3.3.1.2, Inert Area and Grantham South Area:** U.S. Army Corps of Engineers constructed a cap over the Grantham South Area. The Inert Area cap was constructed between 1996 and 1997 by Settling Defendants under the 1995 Consent Decree.

11. **Sections 3.3.3, 3.3.4 and 3.5.4.3:** These sections refer to an "area of combined mass" "between wells MW-18 and MW-34 located south of Grantham South and wells BW-1 and MW-26N located in the northern portion of Llangollen Estates. As stated in the ROD-A2 Responsiveness Summary, the extent to which the Army Creek Landfill and DS&G Sites are contributing to elevated metals concentrations in specific areas of the Upper Potomac Aquifer, including elevated manganese concentrations between the Grantham South Area and monitoring wells BW-1 and MW-26N, has not been established and EPA has concerns about accuracy of the analysis of the "area of combined impacts" presented in Golder Associates' 2014 *Memorandum on Preliminary Cleanup Goals*. That analysis appears to be based on the unsubstantiated premise that elevated manganese concentrations between the eastern lobe of the Army Creek Landfill and monitoring well MW-26N are attributable solely to releases from the Army Creek Landfill Site, and not the waste management areas at the DS&G Site. An effort should be made to determine which source areas are contributing to increasing manganese concentrations at and downgradient of monitoring well MW-26N.

12. **Section 3.3.4, Source of UPA Impacts Observed in Well BW-2:** In the discussion regarding the source of 1,4-dioxane in the BW-2 area, concentrations in BW-2 are compared to concentrations in MW-28, 29, and 31. BW-2 is shown as being screened exclusively in the UPA lower sand while MW-28, 29, and 31 are shown as screened within both the UPA upper and lower sands. If MW-28, -29, and -31 were screened within one interval, then data collected from those wells would be more comparable to BW-2 and could provide more detailed information for this discussion. The noted differences in screened intervals should be recognized in the interpretation of historical data.

13. Appendix 5.6 of SSCR, Rev. 2 does not include ground water elevation contours or flow directions as stated.

14. **Section 3.4.2, Discussion of Release Mechanisms, fourth paragraph:** Migration of dissolved phase impacts due to advective transport from the DDA containment area through gaps in the UPCU (e.g. SS-2011-03) also occurred.

15. **Section 3.5.4.1.1, DDA:** It is noted here that COC-impacted groundwater exists outside the northern DDA slurry wall and the extent of this contamination is unknown. Since this groundwater is outside of the waste management area, additional investigation in this area is warranted.



16. **Section 3.5.4.2, UPCU Transition Zone:** It is noted here that contamination extends to the east and west of the DDA; the plume extent in these locations needs to be delineated.

17. **Section 3.5.4.3, Upper Potomac Aquifer:** As stated in the last paragraph, there is uncertainty regarding the potential presence of groundwater impacts downgradient of the eastern portion of AWC's Llangollen well field. The remedial design should incorporate monitoring wells downgradient of the Llangollen well field.

18. **Section 3.5.5, Surface Water:** In order to properly evaluate groundwater flow gradients and groundwater/surface water interaction, water levels and contours for the Columbia should be provided. A strong vertical gradient downward does not preclude horizontal flow.

19. **Section 3.6.2.3, UPCU Transition Zone from EW PW-1(U) Vicinity to AWC Wellfield:** The discussion here notes that contaminant migration may be facilitated by the coarser-grained layers within the UPCUTZ connecting with the UPA upper sand. This type of detail should be shown on the cross-sections. It is possible that the mounding observed in well P-6 is due to the recharge of these coarser-grained layers. The borehole logs should be revisited for lithologic descriptions of the material encountered in this area.

20. **Section 3.7, Evaluation of Risk, last paragraph:** The discussion suggests that slab-on-grade constructions precludes the potential for exposure to Site-related contaminants due to vapor intrusion. All types of buildings, regardless of foundation type (e.g., basement, crawl space, slab-on-grade), have openings that render them potentially vulnerable to vapor intrusion as discussed in OSWER Publication 9200.2-154.

21. **Section 3.7.3, Receptors and Potential Exposure Pathways, first bullet:** EPA is not aware of any potential for industrial/commercial workers or residents to be exposed to Columbia Aquifer groundwater via ingestion or dermal contact with tap water. Are shallow (Columbia Aquifer) wells in use near the Site?

22. **Section 3.7.4, Risk Summary:** EPA's 2015 Five-Year Review Report also identified the need for additional investigations to evaluate potential releases of contaminants of concern from the Inert Area and the Grantham South Area to groundwater.

23. **Section 3.8, Areas of Uncertainty:** Since it has been noted extensively throughout the document that the UPCUTZ represents a key hydrostratigraphic unit in the area of the Sites and the characterization of this unit is one of the goals of the PDI, it is recommended that wells are constructed in the UPCUTZ (where it exists) at each well location.

24. **Section 4.2, Waste Management Area and Area of Attainment and Section 5.1.4, Define the Boundaries of the Study:** As noted above, the impacted groundwater outside of the waste management area is subject to meeting ARARs and additional work to define the extent of contamination should be proposed.



25. **Section 4.4, Selected Remedy:** The last bullet on page 37 should refer to Figures 6 and 7 rather than Figures 7 and 8.

26. **Section 4.5, Compliance with ARARs:** A discussion of selected ARARs is provided in this section of the Work Plan. Please state that additional ARARs are specified in Appendix D of ROD-A2.

27. **Section 5.1.2, Identify the Goals of the Study:** “Extent of contamination in the UPCUTZ to the east and west of the area of the DDA and well PW-1(U)” is identified as a data gap. The extent of contamination in the UPCUTZ has not been delineated. The assessment of the extent of contamination in the UPCUTZ should extend beyond the DDA/PW-1 area to assess impacts in the P-6 area and elsewhere, if necessary.

28. **Section 6.2.1, Target Capture Zones and Extraction Rates:** Currently, no monitoring wells appear to be located outside of the plume east of UPA-01, and an additional goal of the location 105A/B wells is to delineate the eastern extent of the groundwater plumes. This is noted in Table 2 and should also be mentioned in the text.

29. **Section 6.2.2, Migration between Hydrostratigraphic Units:** It is recommended that the last paragraph incorporates the creation of cross-sections with detailed lithologic information. The generic descriptions of UPA sand, for example, provided on the cross-sections included in this document are not sufficient for the analysis of transport pathways and understanding the interconnection between the UPCUTZ and the UPA upper sand and the source terms and the sands of the UPA

30. **Section 6.3.1, Advancement of Borings and Installation of Monitoring Wells, first paragraph:** The Work Plan does not specify how long the grout should be allowed to cure and does not refer to an appropriate section of the SAP for a more thorough description of how these activities will be conducted. The documents should be reviewed and updated to ensure that direction is clearly provided for staff who will be conducting the field activities.

31. **Section 6.3.1, Advancement of Borings and Installation of Monitoring Wells, fourth paragraph:** Soil samples are proposed to be collected from each of five locations in the UPA upper sand and UPCUTZ to support the design of the extraction well filter packs. Will the material encountered at the proposed locations be similar enough to that anticipated to be encountered in the P-6 area so that the filter pack for P-6-US-EXTR can be sized appropriately?

32. **Section 6.3.1, Advancement of Borings and Installation of Monitoring Wells:** The third paragraph discusses the use of VAP in the selection of screened intervals for monitoring wells. The paragraph states, “...the well screen intervals for the UPCUTZ, UPA upper sand and the UPA lower sand will each be based on the VAP samples from the profile location...” The fifth paragraph contains a similar description of how the screened interval for each well will be selected. Given the lithologic heterogeneity within individual units, as evidenced on many of the boring logs, and expected variations in hydraulic conductivity and the ability of the formation to move COC mass, lithology should be considered, in addition to VAP data, when choosing



monitoring intervals and designing well screens. This comment also pertains to the SAP, e.g., Table A-2.

33. Section 6.3.3, Groundwater Monitoring and Appendix A, Sampling and Analysis Plan: Low-flow purge and sampling is not appropriate for well screens longer than 10 feet. An alternate purging and sampling method should be proposed if a well does not meet this criterion.

34. Section 7.2, Next Steps and Estimated Timeframes: The landfill gas migration assessment is scheduled to be performed 11/1/2018 – 2/1/2019. This activity should be scheduled before the ground is frozen.

35. Sampling and Analysis Plan, Section 4.2.1.2: The second paragraph states, “As part of the PDI activities, the connection between the upper and lower sand units of the UPA between and downgradient of the Sites will be evaluated.” Well couplets or triplets that are proposed to be installed are located either upgradient of P-6 or within approximately 400 feet downgradient of P-6. Review of background materials indicates that two additional well pairs (UPA-02 and DGC-10 locations) are located approximately 1,000 feet downgradient of P-6. This leaves an approximately 2,400-foot length of the mapped plume between the southernmost well pairs and the AWC production wells with no well pairs to evaluate the connection between the upper and lower sands. Additionally, there is very little quality lithologic information for the downgradient portion of the plume, especially along the western portion of the area of attainment, as most of these wells were installed using mud-rotary techniques. The rationale for not installing wells to monitor discrete zones in this area should be added to the Work Plan. The existing monitoring network may be acceptable for current operating conditions. However, it may not be sufficiently robust for performance monitoring of the remedial action and potential future operational changes.

36. Sampling and Analysis Plan, Section 4.8, Analytical Methods: Modifications to EPA Method 537 are not recommended. The lab has provided information pertaining to its modified Method 537 to EPA. EPA is evaluating the lab’s demonstration of capability/method detection limit study and performance testing and quality control data, and will provide comments when the review is completed.

37. Section 4.8 of the SAP notes the use of 21st Edition of Standard Methods. Table A-15 notes ferrous iron will be analyzed by SM 3500 FE D. SM 3500 FE D does not exist in the 21st Edition of Standard Methods. The provided laboratory document notes that the 18th Edition of Standard Methods will be followed. Another difference is that the laboratory uses the 22nd Edition of Standard Methods for other analyses such as sulfide, anions, and alkalinity. Please clarify methods and editions of standard methods to be used.

38. Sampling and Analysis Plan, Figures A-4: Proposed UPA-01-US-EXTR and proposed DDA-10/12-US-EXTR are mislabeled.

39. Sampling and Analysis Plan, Figures A-3, A-6B, A-6C, A-6D, and A-6E: On the figures, wells at locations DDA-18, 19, and 20 are shown in the legend as extraction wells while on Figure A-3 they are shown as monitoring wells. The wells should be correctly identified.



40. **Sampling and Analysis Plan, Table A-6C:** Please update the last two columns on the third page of the table to reflect revisions to the ACL Additional Investigation Work Plan based on ACL stakeholder comments and discussions.

41. **Sampling and Analysis Plan, Table A-14:** Two analytes, arsenic and BCEE, have lab-provided method detection limits that are higher than preliminary remediation goals noted in Work Plan Table 1. The provided analytical SOP (ED-MSS-09) for BCEE does indicate a selective ion monitoring procedure for achieving a quantitation limit lower than the preliminary remediation goal. Please include in Table A-14 quantitation limits and method detection limits for BCEE low level analysis. Please address arsenic.

42. **Sampling and Analysis Plan, Table A-15:** The transportation device (cooler) needs to contain at least one temperature blank to verify proper temperature during shipment. Please include the frequency of temperature blanks in Table A-15 as one per cooler.

EPA Review Comments on Remedial Design Work Plan
Dated October 24, 2018

General Comments

1. The RD Work Plan discusses the installation of extraction wells in the DDA area, both within the slurry wall (ELFExS) and directly south of the containment barrier, north of PW-1 (DDA-10/12-US-EXTR, DDA-05-TZ-EXTR and DDA-06-TZ-EXTR). Section 4.2.3 describes the installation of the additional LFExS wells within the slurry wall and the associated hydraulic testing that will take place prior to construction of the composite barrier cap, which is an acceptable sequence. Because the proposed composite cap is expected to reduce recharge/infiltration into the subsurface, groundwater hydraulics after the cap is installed may be different from groundwater hydraulics prior to cap installation. Therefore, the effects of the cap on groundwater hydraulics should be incorporated into the design. The RD Work Plan should state that the effects of the cap will be included in the design.

2. There is redundant numbering for some footnotes, e.g., “Existing slurry-wall system;^{24[7]}” in Section 3.2.1.

Specific Comments

3. **Section 2.3, Conceptual Site Model and Areas of Uncertainty:** It is noted here that the extent of impacted soil and groundwater in the Columbia Aquifer along then northern DDA slurry wall is an uncertainty. The last sentence of this section states that the activities proposed to address these areas of uncertainty are presented in the PDI WP Summary sections which follow. However, planned activities to evaluate the extent of contamination outside of the DDA is not addressed in Section, 2.4 PDI WP Summary. The issue was identified in comments provided by both DNREC and EPA on the PDI WP. The relevant sections in this Work Plan should be revised to address those comments.



4. **Section 3.1.2.2.2, LFG Mitigation System:** Please update status of direct venting system.
5. **Section 4.1.1, AoA Extraction Well Installation and Section 4.2.4, WMA Extraction Wells Installation:** Section 4 of the Work Plan discusses remedial design components, objectives and performance standards. Please specify in Sections 4.1.1 and 4.2.4 of the Work Plan that “[t]he effectiveness of the groundwater extraction system in capturing and containing contaminant mass will be routinely evaluated and the system will be modified as necessary to achieve the RAO for groundwater in the Upper Potomac Aquifer,” as stated in the description of the Selected Remedy in ROD-A2.
6. **Section 4.2.1, Slurry-wall System:** Performance standards for the slurry wall are given in the 1993 ROD Amendment. Please include this information in the Work Plan.
7. **Section 5.1, Preliminary (30%) RD:** The Preliminary RD deliverable for RD-2 should include anticipated conveyance piping route and connection location for UPCUTZ extraction wells.

